

CLAIMS

What is claimed is:

1. An RFID integrated circuit including:

a demodulator to receive a first signal, the first signal having been generated by an RFID reader responsive to detection of a first environmental condition; and

a controller to configure the RFID integrated circuit to modulate a backscatter signal according to a first modulation format, based on the first signal.
2. The RFID integrated circuit of claim 1, wherein the demodulator is to receive a second signal, the second signal having been generated by the RFID reader responsive to detection of a second environmental condition, and wherein the controller is to configure the RFID integrated circuit to modulate the backscatter signal according to a second modulation format, based on the second signal.
3. The RFID integrated circuit of claim 2, wherein the first signal includes a first configuration parameter for the first modulation format, and the second signal includes a second configuration parameter for the second modulation format.
4. The RFID integrated circuit of claim 3, wherein the first configuration parameter and the second configuration parameter each comprise at least one of

a bit rate, cycles per symbol, subcarrier frequency and symbol assignment, and backscatter duration.

5. The RFID integrated circuit of claim 2, wherein the first and second signals each include a command to configure the RFID integrated circuit to modulate the backscatter signal according to the first and second modulation format, respectively.
6. The RFID integrated circuit of claim 2, wherein the first modulation format is a baseband modulation format, and the second modulation format is a non-baseband modulation format.
7. The RFID integrated circuit of claim 6, wherein the baseband modulation format comprises at least one of an FM0, a Manchester, and a PWM modulation format.
8. The RFID integrated circuit of claim 6, wherein the non-baseband modulation format is a subcarrier modulation format.
9. The RFID integrated circuit of claim 8, wherein the subcarrier modulation format includes at least one of a group of modulation formats including a frequency shift key (FSK) modulation format, an amplitude shift key (ASK) modulation format, and a phase shift key (PSK) modulation format.
10. The RFID integrated circuit of claim 2, wherein the first and second environmental conditions each include at least one of a group of environmental conditions including a number of RFID tags in an environment, a number of

RFID readers in the environment, a frequency of at least one of RFID reader in the environment, a geographic location, and radio-frequency noise in the environment.

11. The RFID integrated circuit of claim 2, further including a modulator, wherein the controller is to configure the modulator to support each of the first and the second modulation formats.

12. The RFID integrated circuit of claim 11, wherein the controller is to modify a modulator switch signal, supplied to the modulator of the RFID integrated circuit, in accordance with at least one of the first and the second modulation formats.

13. The RFID integrated circuit of claim 2, further including a state machine to transition to at least one of a first state, to configure the RFID integrated circuit to modulate according to the first modulation format, and to a second state, to configure the RFID integrated circuit to modulate according to the second modulation format.

14. The RFID integrated circuit of claim 2, further including a command decoder to decode a command received in one of the first and the second signals to switch a state of integrated circuit state machine.

15. An RFID reader including:

an interface to receive an input at the RFID reader indicating at least one of a plurality of environmental conditions pertaining to an environment in

which the RFID reader is to operate; and

a controller to select a first modulation format of a plurality of modulation formats based on the input, and to configure the RFID reader to demodulate a received backscatter radio-frequency signal utilizing the first modulation format of the plurality of modulation formats.

16. The RFID reader of claim 15, further including a demodulator, wherein the controller is to configure the demodulator of the RFID reader to demodulate the received backscatter signal according to the first modulation format of the plurality of modulation formats.

17. The RFID reader of claim 16, wherein the controller is to modify a demodulator switch signal, supplied to the demodulator of the RFID reader, in accordance with the first of the plurality of modulation formats.

18. The RFID reader of claim 15, wherein the plurality of modulation formats includes a baseband modulation format and non-baseband modulation format.

19. The RFID reader of claim 18, wherein the baseband modulation format comprises at least one of a group of baseband modulation formats, the group of baseband modulation formats including an FMØ, a Manchester, and an PWM modulation format.

20. The RFID reader of claim 18, wherein the non-baseband modulation format is a subcarrier modulation format.

21. The RFID reader of claim 20, wherein the subcarrier modulation format includes at least one of a frequency shift key (FSK) modulation format, an amplitude shift key (ASK) modulation format, and a phase shift key (PSK) modulation format.
22. The RFID reader of claim 15, including an interface, wherein the input identifying the at least one environmental condition is received via the interface.
23. The RFID reader of claim 22, wherein the interface is a user interface, and the input identifying the at least one environmental condition is manually provided to the RFID reader by a user.
24. The RFID reader of claim 22, wherein the interface is a network interface to a further computer system, and the input identifying the at least one environmental condition is received via a network from the further computer system.
25. The RFID reader of claim 22, wherein the interface is a wireless interface, and the input is a signal received from a further RFID reader indicating a presence of the further RFID reader within an environment in which the RFID reader is operating.
26. The RFID reader of claim 22, wherein the interface is a wireless interface, and the input is a signal received from at least one further RFID reader operating within the environment, and wherein the controller is to determine whether at least a threshold number of further RFID readers are operating within the environment, and is to configure the RFID reader

to demodulate according to the first modulation format of the plurality of modulation formats responsive to the determination that at least the threshold number of further RFID readers are operating within the environment.

27. The RFID reader of claim 22, wherein the interface is a wireless interface, and the input is a signal received from a further RFID reader, and wherein the controller is to determine that the RFID reader and the further RFID reader are transmitting utilizing a common channel, and is to configure the RFID reader to demodulate the received backscatter radio-frequency signal utilizing the first modulation format of the plurality of modulation formats in response to the determination that the RFID reader and the further RFID reader are transmitting utilizing the common channel.

28. The RFID reader of claim 22, wherein the interface is a wireless interface, and the input comprises a plurality of signals received from tags within an environment in which the RFID reader is operating.

29. The RFID reader of claim 18, wherein the controller is to utilize the plurality of signals received from the tags within the environment to determine a tag population density within the environment.

30. The RFID reader of claim 29, wherein the controller is to configure the RFID reader to utilize the first modulation format of the plurality of modulation formats based on the determined population density within the environment.

31. The RFID reader of claim 22, wherein the interface is a global positioning

system (GPS) interface, and the input is a signal identifying a geographic location at which the RFID reader is operating.

32. The RFID reader of claim 15, wherein the controller is to determine that a quality of a received radio-frequency signal is below a threshold quality level, and is to configure the RFID reader to demodulate according to the first of the plurality of modulation formats if the quality of the received radio signal is below the threshold quality level.

33. An RFID system including:

an RFID reader interface to receive an input indicating at least one of a plurality of environmental conditions pertaining to an environment in which the RFID reader is to operate; and

an RFID reader controller, based on the input, to select a first modulation format of a plurality of modulation formats and to configure a population of RFID tags to modulate a backscatter signal according to the first modulation format of the plurality of modulation formats.

34. The RFID system of claim 33, wherein the plurality of modulation formats includes a baseband modulation format and non-baseband modulation format.

35. The RFID system of claim 34, wherein the baseband modulation format comprises at least one of a group of baseband modulation formats including an FMØ, a Manchester, and a PWM modulation format.

36. The RFID system of claim 34, wherein the non-baseband modulation format is a subcarrier modulation format.
37. The RFID system of claim 36, wherein the subcarrier modulation format includes at least one of a group of modulation formats including a frequency shift key (FSK) modulation format, an amplitude shift key (ASK) modulation format, and a phase shift key (PSK) modulation format.
38. The RFID system of claim 33, wherein the input indicating the at least one environmental condition is received from any one of a group of sources including a user, a further networked computer system, a further RFID reader, and the population of RFID tags.
39. A method to configure an RFID integrated circuit according to an environmental condition, the method including:
- responsive to a first signal, indicating a first environmental condition, configuring the RFID integrated circuit to modulate a backscatter signal according to a first modulation format; and
 - responsive to a second signal, indicating a second environmental condition, configuring the RFID integrated circuit to modulate the backscatter signal according to a second modulation format.
40. The method of claim 39, wherein the first signal includes a first configuration parameter for the first modulation format, and the second signal

includes a second configuration parameter for the second modulation format.

41. The method of claim 40, wherein the first configuration parameter and the second configuration parameter each comprise at least one of a group of configuration parameters including a bit rate, cycles per symbol, subcarrier frequency, symbol assignment, and backscatter duration.

42. The method of claim 39, wherein the first and second signals each include a command to configure the RFID integrated circuit to modulate the backscatter signal according to the first and second modulation format, respectively.

43. The method of claim 39, wherein the first modulation format is a baseband modulation format, and the second modulation format is a non-baseband modulation format.

44. The method of claim 43, wherein the baseband modulation format comprises at least one of a FMØ, a Manchester, and a PWM modulation format.

45. The method of claim 43, wherein the non-baseband modulation format is a subcarrier modulation format.

46. The method of claim 45, wherein the subcarrier modulation format includes at least one of a frequency shift key (FSK) modulation format, an amplitude shift key (ASK) modulation format, and a phase shift key (PSK) modulation format.

47. The method of claim 39, including:

generating the first signal at an RFID reader and transmitting the first signal to the RFID integrated circuit, based on detection of the first environmental condition; and

generating the second signal at the RFID reader and transmitting the second signal to the RFID integrated circuit, based on detection of the second environmental condition.

48. The method of claim 47, wherein the first and second environmental conditions including one of a group of environmental conditions including a number of integrated circuits in an environment, a number of RFID readers in the environment, a geographic location, and radio-frequency noise in the environment.

49. The method of claim 39, wherein the RFID integrated circuit includes a modulator, and the configuring of the RFID integrated circuit includes configuring the modulator to support one of the first and the second modulation formats.

50. The method of claim 49, wherein the configuring of the modulator includes modifying a modulator switch signal, supplied to the modulator of the RFID integrated circuit, in accordance with one of the first and the second modulation formats.

51. The method of claim 39, wherein the RFID integrated circuit includes a state machine, and wherein the configuring of the RFID integrated circuit

includes transitioning the state machine to at least one of a first state, to configure the RFID integrated circuit to modulate according to the first modulation format, and a second state, to configure the RFID integrated circuit to modulate according to the second modulation format.

52. The method of claim 51, wherein the RFID integrated circuit includes a command decoder, and wherein the configuring of the RFID integrated circuit includes decoding a command received in one of the first and the second signals to switch a state of the state machine.

53. A method to configure an RFID reader, the method including:

receiving an input at the RFID reader indicating at least one of a plurality of environmental conditions pertaining to an environment in which the RFID reader is to operate;

selecting, at the RFID reader, a first modulation format of a plurality of modulation formats based on the input; and

configuring the RFID reader to demodulate a received backscatter radio-frequency signal according to the first modulation format of plurality of modulation formats.

54. The method of claim 53, wherein the configuration of the RFID reader to demodulate according to the first modulation formats of the plurality of modulation formats includes configuring a demodulator of the RFID reader to demodulate the received backscatter signal according to the first of the plurality

of modulation formats.

55. The method of claim 56, wherein the configuring of the demodulator of the RFID reader includes modifying a demodulator switch signal, supplied to the demodulator of the RFID tag, in accordance with the first of the plurality of modulation formats.

56. The method of claim 53, wherein the plurality of modulation formats includes a baseband modulation format and non-baseband modulation format.

57. The method of claim 56, wherein the baseband modulation format comprises at least one of an FMO, a Manchester, and an PWM and a line code modulation format.

58. The method of claim 56, wherein the non-baseband modulation format is a subcarrier modulation format.

59. The method of claim 58, wherein the subcarrier modulation format includes at least one of a frequency shift key (FSK) modulation format, an amplitude shift key (ASK) modulation format, and a phase shift key (PSK) modulation format.

60. The method of claim 53, wherein the input identifying the at least one environmental condition is manually inputted.

61. The method of claim 53, wherein the input identifying the at least one environmental condition is received via an interface of the RFID reader.

62. The method of claim 61, wherein the interface is an antenna interface, and the input is a signal received from a further RFID reader indicating a presence of the further RFID reader in an environment in which the RFID reader is to operate.

63. The method of claim 53, wherein the input is a signal received from at least one further RFID reader operating within the environment, and wherein the configuring of the RFID reader includes determining whether at least a threshold number of further RFID readers are operating within the environment, and configuring the RFID reader to demodulate according to the first of the plurality of modulation formats responsive to the determination that at least the threshold number of further RFID readers are operating within the environment.

64. The method of claim 53, wherein the input is a signal received from a further RFID reader, the method including determining that the RFID reader and the further RFID reader are transmitting utilizing a common channel, and configuring the RFID reader to demodulate the received backscatter radio-frequency signal according to the first modulation format in response to the determination that the RFID reader and the further RFID reader are transmitting utilizing the common channel.

65. The method of claim 53, wherein the input comprises a plurality of signals received from tags within an environment in which the RFID reader is operating.

66. The method of claim 65, including utilizing the plurality of signals received from the tags within the environment to determine a tag population

density within the environment.

67. The method of claim 66, including configuring the RFID reader to utilize the first of the plurality of modulation formats based on the determined population density within the environment.

68. The method of claim 53, wherein the input is a GPS-based signal identifying a geographic location within which the RFID reader is operating.

69. The method of claim 53, wherein the configuring of the RFID reader includes determining that the quality of a received radio-frequency signal is below a threshold quality level, and configuring the RFID reader to demodulate according to the first modulation formats of the plurality of modulation formats if the quality of the received radio signal is below the threshold quality level.

70. A method to operate an RFID reader, the method including:

receiving an input at the RFID reader indicating at least one of a plurality of environmental conditions pertaining to an environment in which the RFID reader is to operate; and

causing the RFID reader, based on the input, to select a first modulation format of a plurality of modulation formats and to configure a population of RFID tags to utilize the first modulation format of the plurality of modulation formats.

71. The method of claim 70, wherein the plurality of modulation formats

includes a baseband modulation format and non-baseband modulation format.

72. The method of claim 71, wherein the baseband modulation format comprises at least one of an FMO, a Manchester, and an PWM modulation format.

73. The method of claim 71, wherein the non-baseband modulation format is a subcarrier modulation format.

74. The method of claim 73, wherein the subcarrier modulation format includes at least one of a frequency shift key (FSK) modulation format, an amplitude shift key (ASK) modulation format, and a phase shift key (PSK) modulation format.

75. The method of claim 74, wherein the input identifying the at least one environmental condition is received via an interface of the RFID reader from any one of a group of sources, the group of sources including a user, a further networked computer system, a further RFID reader, and the population of RFID tags.

76. The method of claim 70, wherein the causing of the RFID reader to select the first modulation format includes determining that a quality of a received radio-frequency signal is below a threshold quality level, and selecting the first modulation format if the quality of the received radio signal is below the threshold quality level.

77. An RFID integrated circuit including:

first means for receiving a first signal, the first signal having been generated by an RFID reader responsive to detection of a first environmental condition; and

second means for configuring the RFID integrated circuit to modulate a backscatter signal according to a first modulation format, based on the first signal.

78. An RFID reader including:

an interface to receive an input at the RFID reader indicating at least one of a plurality of environmental conditions pertaining to an environment in which the RFID reader is to operate; and

a controller to select a first modulation format of a plurality of modulation formats based on the input, and to configure the RFID reader to demodulate a received backscatter radio-frequency signal utilizing the first modulation format of the plurality of modulation formats.

79. An RFID system including:

first means for receiving an input indicating at least one of a plurality of environmental conditions pertaining to an environment in which an RFID reader is to operate; and

second means, based on the input, for selecting a first modulation format

of a plurality of modulation formats and for configuring a population of RFID tags to modulate a backscatter signal according to the first modulation format of the plurality of modulation formats.